

Fitness Testing Guide

INTRODUCTION

This guide is presented as a service to athletes, coaches, parents and exercise physiologists, who wish to evaluate their own or someone else's fitness level, or to gain a greater understanding of tests that they have performed.

There are probably hundreds of standard fitness tests used, and hundreds more variations of these. They can range from elaborate and expensive laboratory tests to simple and inexpensive field tests. Each test also has many advantages and disadvantages that can ultimately determine which is the most appropriate test to perform. If you are designing your own fitness testing regime, with the information about the relative merits and requirements of each test that is contained in this guide, you can make an informed choice of the most appropriate test or tests to use.

Firstly this guide discusses why we should perform fitness testing and the benefits of testing, then how to select appropriate fitness tests, some tips about conducting tests, and interpret the results. There are also some further readings so you can find some more detailed information yourself.

Once you have a good understanding of the issues concerning fitness testing, you can go and explore the growing list of tests and their descriptions on this site.

WHY FITNESS TEST?

Performance in any sporting event is the result of a multitude of factors, which include the amount of training performed, the body's adaptation to the training, motivation level, nutritional status and weather conditions to name a few. As you can see, physiological parameters only account for a portion of any performance, and so the role of any exercise physiologist is also similarly limited. Through fitness testing, the factors involving physiological processes, over which there is some control, can be measured and ultimately improved upon.

Competition is the ultimate test of performance capability, and is therefore the best indication of training success. However, when trying to maximise performance, it is important to determine the athlete's ability in individual aspects of performance. Fitness testing attempts to measure individual components of performance, with the ultimate aim of studying and maximising the athlete's ability in each component.

BENEFITS OF FITNESS TESTING - Identify Weaknesses and Strengths

Of the many benefits of fitness testing, the major use is to establish the strengths and weaknesses of the athlete. This is done by comparing test results to other athletes in the same training group, the same sport, or a similar population group. Previous test results of large groups are often published as normative tables.

By comparing results to successful athletes in your sport, you can see the areas which need improvement, and the training programme can be modified accordingly. This way

valuable training time can be used more efficiently. However, beware that some athletes perform well in their sport despite their physical or physiological attributes, and it may not be advantageous to be like them.

Monitor Progress

The initial testing session can give the athlete an idea of where their fitness levels are at the start of a programme, so that future testing can be compared to this and any changes can be noted. A baseline is especially important if you are about to embark on a new training phase. Subsequent tests should be planned for the end and start of each new phase.

By repeating tests at regular intervals, you can get an idea of the effectiveness of the training programme. The time-frame between tests can depend on the availability of time or costs involved, or the phase of training the athlete is in. Depending on these factors, the period between tests may range from two weeks to six months. It usually takes a minimum of 2-6 weeks to see a demonstrable change in any aspect of fitness.

Provide Incentives

The incentive to improve can often be provided by the 'goal' of a certain test score. By knowing that they will be tested again at a later date, the athlete can aim to improve in that area.

Talent Identification

Testing is primarily used for help in designing the most appropriate athletic training programme. A general non-sport specific testing battery can provide you with an idea of your basic strengths and weaknesses, and from this you may find you would be better suited to another sport which makes better use of your strengths. Although testing has sometimes been used in this way for talent identification, it has generally not been very reliable in predicting the future success of juniors (mainly due to varying growth patterns) and in sports which rely heavily on other factors such as technique, tactics and psychological factors.

SELECTING FITNESS TESTS

There is often a standard set of tests that are performed for the fitness testing of any sport. If you do not have access to such a list, or you wish to modify a protocol to suit individual needs, you can use the following information to design your own testing regime. Remember that the test that best determines your capability in any component of fitness is not always the most appropriate tests to perform; there are many other factors to consider.

Identifying Components of Performance

The first step in designing a fitness testing regime is to identify the components of fitness that you wish to investigate. These may depend on the phase of training or the phase of the season in which the testing is being done. Each sport requires certain attributes and relies on certain factors more than others for successful performance. For example, you would not necessarily want to test a marathon runner on sprinting speed. Your fitness

testing time could be better spent on doing more relevant tests.

One method of categorising the different components of fitness are as presented on the list of tests, though this categorisation is somewhat arbitrary. Your testing battery may include a few similar tests from one fitness component and none from others, depending on what your aims of the testing are.

Standardised Protocols

The test protocols need to be standardised so that comparisons can be made between your test scores performed at different times and comparisons between athletes tested at different places. Athletes and coaches should be aware of the need to control for factors which can affect the results obtained. Such things that need to be controlled are: the warm up, order of tests, recovery periods, environmental conditions, and fluid and nutritional status. If comparing test results to normative tables, the test must be conducted exactly the same as it was when the original test group was tested, for the comparison to be valid.

Relevance

You need to select sport specific tests. If you believe that the tests are relevant to the sport you play, you will be more inclined to put a maximal effort into the testing. If not, you can be wasting valuable time on tests that are not relevant to your particular sport, and the results will be meaningless.

Reliability

A test is considered reliable if the results are consistent and reproducible over time. You should be able to obtain the same or similar result on two separate trials. This is important as you are often looking for small changes in scores.

Some of the errors in recording of tests results can come about from poor following of the test protocols, equipment error, variability in environmental conditions and/or surfaces. Reliability can be improved by greater control of these variables, and by using competent and well trained testers, though there is still some variability expected. All the equipment used should be standard and regularly calibrated to the manufacturer's standards. If more than one test is being conducted at a time, the ordering of tests can affect results for each test, as can the training and fatigue of the athlete between test sessions. If the test requires pacing or practice, the more experienced athletes will do better at maximising their score, and the score will be more reliable.

Validity

Validity is whether the tests actually measure what they set out to. Tests can be reliable but not valid. The validity of a test is usually better if the test is specific to the sport being tested: i.e., the tests should resemble the sport being tested, so that similar actions and therefore the specific muscle groups and muscle fibre types actually used in the sport are being used.

Interpretable Results

If you don't know what the numbers in the results mean, the tests are fairly useless. The results must have meaning so that they can be applied to modify a training programme. If you want to compare the results to that of other groups you must have access to normative data ('norms'). These norms should be based on a large homogeneous population, be up to date, and preferably be of local origin.

Facilities and Other Testing Demands

The time, costs, equipment and personnel required can be the most important considerations when selecting a test, and often determines what tests are actually conducted. This is especially important if you intend to test large groups of athletes.

CONDUCTING TESTS - Test Sequence

Testing order can affect performance in some tests. Blood pressure and resting heart rate should always be tested first. Some tests should be scheduled early in the session as they should not be preceded by a warm up (e.g.. some flexibility tests). If there are several muscular strength and endurance tests in one session, you must allow plenty of time for recovery between tests. Exhausting tests, such as a VO₂max test, should be scheduled for a separate session, or at least at the end of a session. Other tests based on a heart rate response (e.g. many submaximal endurance tests) may be affected by previous tests and by the mental state of the athlete, and should be scheduled accordingly.

Scheduling

Testing should be done at the beginning of phases of training, and then at regular intervals. For school groups it may be appropriate to schedule testing at the beginning and ends of school semesters.

Safety

Safety checks should be done prior to any testing session, such as checking proper working of equipment, and adequate supply of mats. During the sessions, give adequate warm-up when necessary. For maximal endurance testing on elderly and special populations, medical assistance should be close at hand, and adequate resuscitation equipment should be available nearby.

Any person older than 35 years of age, particularly anyone overweight or with a history of high blood pressure and heart disease, should consult a physician before undertaking any vigorous testing. Fitness testing should not be avoided, as for this population, it can be useful as a screening device and to help devise a programme to suit special needs.

Scoring Sheets

Well designed scoring sheets make recording scores more efficient and avoid errors. They should include space for personal details, age, date and time, weather or laboratory conditions, recorder's name, and a record of all trials for each test. Other optional space to include are training phase and fitness level of the athletes, and room for subsequent tests.

Test Assistants

All test assistants should be adequately trained prior to testing, to ensure correct administration of the tests, and reduce error between testers.

Session Organisation

Good organisation will ensure the testing session runs smoothly. If testing a large group, you may want to set up testing stations with a different tester at each station, or with one tester following the same group around the stations.

INTERPRETATION OF RESULTS - Relative Importance

The first step in the interpretation of test results requires you to determine how important each of the components that were tested are to the overall performance in the sport. For example, while a poor result in a body fat test for a basketballer may be of concern, it is not as vital as a poor result in an endurance test. The relative importance of each fitness component normally requires a good understanding of the physiology involved, and so is best done by a qualified exercise physiologist.

Comparison to Norms

If the results are being compared to norms, you must consider if the norms used the same protocol, and the subject population and age group are similar. Also, published norms may give the averages for a certain population, but this does not always indicate what is the desirable level for that particular parameter.

Significance

Are the changes seen from test to test significant? There is normal variation in results from test to test due to factors such as biological variation, tester error, equipment calibrations, conditions, etc., so you must decide if the differences recorded are significant to affect performance, and are greater than can be expected from general sources of error.

Presentation

Following correct and thorough testing, the presentation of results to the athlete or coach can be the most important step if any recommendations are implemented. A good way of illustrating the results is with a chart or plot, where initial and subsequent tests can be overlaid or compared side to side so that changes over time can be easily determined.

Fitness Testing References

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